revealed that both sets of previously published primers have sequences identical to that of *F. circinatum*. The sequences for these primer sets were also different from those associated with the IGS sequences of species other than *F. circinatum*. These data therefore show that the existing IGS PCR-based diagnostic procedures for the pitch canker pathogen are indeed specific for the fungus and should allow unambiguous identification of *F. circinatum*.

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The establishment of *in vitro* screening methods for evaluating sugarcane (*Saccharum* spp. hybrids) susceptibility to *Ustilago scitaminea* H. & P. Sydow and *Eldana saccharina* Walker

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The fungal disease smut (causal agent: *Ustilago scitaminea* H. & P. Sydow) and stalk borer eldana (*Eldana saccharina* Walker) place major constraints on sugarcane agriculture in South Africa. Although various methods are being applied to manage smut and eldana, the best approach is the introduction of resistant cultivars. However, conventional field-based screening for pest and disease resistance requires several years. This study evaluates *in vitro* techniques combined with artificial inoculation as rapid screening methods. Inoculation of sugarcane at two developmental stages was investigated: 3 month old plantlets derived from apical meristems and 8–10 week old embryogenic callus derived from immature leaf rolls. *U. scitaminea* spores were collected from field-infected sugarcane, surface decontaminated by a 3× wash in 0.5 g/l streptomycin sulphate solution and cultured to generate infective sporidia. Two concentrations of sporidial suspensions (1×10^6 and 1×10^9 sporidia ml^{-1}) were used to inoculate plantlets (0.5 µl with a Hamilton® syringe, applied 1 cm above the apical meristem) and callus (via dipping, soaking and vacuum infiltration). The development of a characteristic smut whip was observed *in vitro* after 10–12 weeks. Evaluation using callus is underway. Surface decontamination of 5 day old eldana eggs was achieved by exposure to 1% sodium hypochlorite (NaOCl) for 15 min. Feeding bioassays were conducted by placement of first instar larvae on *in vitro* plantlets and callus. Larval mass and length were recorded after 3 and 2 weeks respectively. Preliminary investigations were conducted on cultivar NCo376 which is susceptible to smut and eldana. Future investigations will be conducted on five 'test' cultivars whose identity and associated field resistance rating will remain undisclosed until completion of the experiments. Data subjected to statistical analyses will be used to assess the accuracy of an *in vitro* approach. Finally, the most suitable screening methods for evaluating sugarcane susceptibility to smut and eldana will be determined.

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Comparing urban areas: Quantifying urbanisation using a gradient approach

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The contemporary world is an urban world, wherein urban agglomerations harbour more than half of the human population on earth. Anthropogenic influences dramatically alter the functioning of ecosystems, especially in and near cities. As a result, urban areas represent complex assemblages of unique vegetation communities. The multitude of influences on cities adds to this complexity and understanding the underlying patterns and processes operating in urban areas become increasingly important in a time where human altered ecosystems are among the least understood of all. The urban–rural gradient approach often used to study these patterns and processes, aims to quantify the existing gradient allowing comparisons of vegetation at different locations, each with diverse human influences. Previous studies were not truly comparative due to differences in measures used to quantify the gradient and a lack of a well-defined definition for urban areas. This study compares the results of testing urbanisation measures in two diverse urban areas, namely Melbourne, Australia (population approximately 3 700 000) and Klerksdorp, South Africa (population approximately 220 000), in order to contribute towards the creation of a standard set of measures to allow comparison of cities on a global scale. Comparative urban ecological research could potentially distinguish globally recurring patterns from more local phenomena. Both studies indicated that urbanisation influences vegetation composition and survival and that urbanisation measures could successfully be used to quantify an urban–rural gradient. However, in both of the urban areas it was apparent that demographic and physical measures, as well as landscape metrics, should be used to accurately quantify the gradient. The urbanisation measures correlated well to the surveyed vegetation of the urban areas, emphasising their ecological significance and usefulness as indicators of underlying patterns and processes. The current study illustrates the feasibility of attempting the development of a global set of standard measures. In a world where urbanisation is one of the main threats to biodiversity loss, understanding the urban environment becomes imperative if not essential in the battle of ensuring a sustainable future.

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